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Application No. 2002/0754

Date of Filing 19th September 2002

Applicant ATROPOS LIMITED, an Irish company, of Unit 4,  
Sunnybank Centre, Bray, County Wicklow, Ireland

Dated this 1<sup>st</sup> day of August 2003.



An officer authorised by the  
Controller of Patents, Designs and Trademarks.

## REQUEST FOR THE GRANT OF A PATENT

PATENTS ACT, 1992

The Applicant(s) named herein hereby request(s)

  X   the grant of a patent under Part II of the Act

           the grant of a short-term patent under Part III of the Act on the basis of the information furnished hereunder.

1. Applicant(s)

Name           ATROPOS LIMITED

Address       Unit 4, Sunnybank Centre, Bray, County Wicklow, Ireland.

Description/Nationality

An Irish company.

2. Title of Invention

"A Device"

3. Declaration of Priority on basis of previously filed application(s) for same invention (Sections 25 & 26)

Previous filing date

Country in or for  
which filed

Filing No.

4. Identification of Inventor(s)

Name(s) of person(s) believed  
by Applicants(s) to be the inventor(s)

Name:       Frank Bonadio, a citizen of the United States of America.

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Name:       Trevor Vaughn, an Irish citizen

Address:   Garbally, Birr, County Offaly, Ireland.

5. Statement of right to be granted a patent (Section 17(2) (b))

The Applicant derives the rights to the Invention by virtue of a Deed of Assignment dated September 18, 2002.

6. Items accompanying this Request – tick as appropriate

- (i)   X   Prescribed filing fee (€125.00)
- (ii)   X   Specification containing a description and claims  
       Specification containing a description only  
  X   Drawings referred to in description or claims
- (iii)        An abstract
- (iv)        Copy of previous application(s) whose priority is claimed
- (v)        Translation of previous application(s) whose priority is claimed
- (vi)   X   Authorisation of Agent (this may be given at 8 below if this Request is signed by the Applicant (s))

7. Divisional Application (s)

The following information is applicable to the present application which is made under Section 24 –

Earlier Application No: .....

Filing Date: .....

8. Agent

The following is authorised to act as agent in all proceedings connected with the obtaining of a patent to which this request relates and in relation to any patent granted -

Name

Address

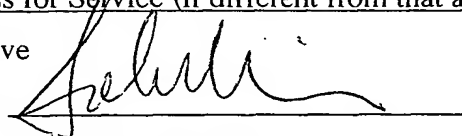
John A. O'Brien & Associates

The address recorded for the time being in the Register of Patent Agents, and currently Third Floor, Duncairn House, 14 Carysfort Avenue, Blackrock, Co. Dublin, Ireland.

9. Address for Service (if different from that at 8)

As above

Signed



JOHN A. O'BRIEN & ASSOCIATES

Date September 19, 2002



5      Introduction

This invention relates to a wound retractor suitable for retracting the sides of wound opening laterally.

10      Statements of Invention

According to the invention there is provided a wound retractor comprising:-

15                      a retracting member for insertion into a wound opening; and

                         a proximal member for location externally of a wound opening;

the proximal member being movable relative to the retracting member to shorten the axial extent of the retracting member to laterally retract a wound opening.

20

In one embodiment the proximal member comprises an annular ring means.

25      In one case the annular ring means comprises an inner ring and an outer ring between which the retracting member may be lead. One of the rings may define a projection for location in a complimentary recess of the outer ring with the retracting member located therebetween. The projection may be a relatively tight fit in the recess to grip the retracting member therebetween. In one arrangement the projection is locatable in the recess in a snap-fit manner.

In one embodiment the inner ring defines the projection and the outer ring defines the recess.

5 Alternatively the outer ring defines the projection and the inner ring defines the recess.

In one embodiment the proximal member comprises one or more valves to facilitate sealed access of an object through the proximal member.

10 In an aspect of the invention the retractor comprises a distal member coupled to a distal end of the retracting member. The distal member may comprise an O-ring. Alternatively the distal member comprises an annular disc. The distal member may be of a resilient material.

15 In one embodiment the retracting member is flared distally outwardly.

In one aspect the retractor comprises means to seal a retracted wound opening. The sealing means may be provided externally of a wound opening.

20 Typically, the sealing means is mountable to the proximal member. The sealing means may comprise a cap.

In one embodiment the sealing means comprises one or more valves to facilitate sealed access of an object through the sealing means.

25 In one arrangement the retracting member comprises a sleeve to line a wound opening.

30 The invention also provides a method of retracting a wound opening, the method comprising the steps of:-

providing a wound retractor comprising a retracting member, and a proximal member;

5           inserting the retracting member into a wound opening;

          locating the proximal member externally of the wound opening; and

10           moving the proximal member relative to the retracting member to shorten the axial extent of the retracting member to laterally retract the wound opening.

15           In one embodiment the retracting member comprises a proximal portion located proximally of the proximal member and a distal portion located distally of the proximal member, and the method comprises the step of decoupling the proximal portion from the distal portion after retraction of the wound opening.

          The proximal portion may be decoupled from the distal portion by a cutting action.

20           In one arrangement the proximal member comprises an inner ring and an outer ring, and the method comprises the step of snap-fitting the inner ring relative to the outer ring to grip the retracting member therebetween. The inner ring may be snap-fitted relative to the outer ring after retraction of the wound opening.

25           In one embodiment the step of snap-fitting the inner ring relative to the outer ring decouples the proximal portion of the retracting member from the distal portion.

30           In another aspect the method comprises the step of mounting the retracting member to an obturator, and the obturator is inserted into the wound opening to insert the retracting member into the wound opening.

Typically, the method comprises the step of sealing the retracted wound opening.

Brief Description of the Drawings

5       The invention will be more clearly understood from the following description of some embodiments thereof, given by way of example only, with reference to the accompanying drawings, in which:-

10               Fig. 1 is a cross-sectional, side view of a wound retractor according to the invention, in use;

              Fig. 2 is a perspective view of the retractor of Fig. 1 being inserted into a wound opening;

15               Figs. 3 to 5, 7 and 9 are cross-sectional, side views of the wound opening being retracted using the retractor of Fig. 1

              Fig. 6 is a plan view of the retractor and the wound opening of Fig. 5;

20               Fig. 8 is a plan view of the retractor and the wound opening of Fig. 7;

              Figs. 10 and 11 are views similar to Figs. 5 and 6 of a wound opening being retracted in an alternative manner using the retractor of Fig. 1;

25               Figs. 12 and 13 are cross-sectional, side views of a wound opening being retracted using the retractor of Fig. 1 and an obturator;

              Figs. 14 and 15 are cross-sectional, side views of a wound opening being retracted using the retractor and the obturator of Figs. 12 and 13 and a pusher;

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Fig. 16 is a cross-sectional, side view of the retractor of Fig. 1 and a sealing cap;

Figs. 17 and 19 are perspective views of a distal end of other wound retractors according to the invention;

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Figs. 20 to 22 are perspective views of an inner ring part of other wound retractors according to the invention;

10

Fig. 23 is a cross-sectional, side view of another wound retractor according to the invention;

#### Detailed Description

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Referring to Figs. 1 to 16, there is illustrated a wound retractor 1 according to the invention. The retractor 1 comprises a proximal member 2 for location, in use, externally of a wound opening 3, a retracting member 4 for insertion into the wound opening 3, and a distal member 5 coupled to a distal end of the retracting member 4.

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In this case, the retracting member 4 is provided in the form of a sleeve of flexible, polymeric film material which lines the sides of the wound opening 3 when the retractor 1 is in use (Fig. 1). The distal member 5 in this case comprises a resilient O-ring.

25

The proximal member 2 is provided, in this case, in the form of an annular ring means having an inner ring 6 and an outer ring 7 with the retracting member 4 lead between the rings 6, 7. The inner ring 6 has a circular cross-section and the outer ring 7 defines a "C"-shaped recess. In this manner a projecting portion of the inner ring 6 may be located in a snap-fit manner in the complimentary recess of the outer ring 7. The inner ring 6 is configured to be a relatively tight fit in the recess of the outer ring 7 to securely grip the retracting member 4 between the two rings 6, 7.

30



In use, a relatively small incision 8 is made in an abdominal wall 9 to form the wound opening 3. A typical length for the incision 8 is in the range of from 12mm to 30mm. The resilient distal O-ring 5 is then manipulated into an elongate, oblong shape by squeezing the distal O-ring 5 to facilitate insertion of the distal O-ring 5 through the wound opening 3 (Fig. 2), until the distal O-ring 5 is fully located within the abdominal cavity 10 and the sleeve 4 lines the wound opening 3 (Fig. 3). The sleeve 4 is then pulled upwardly to cause the distal O-ring 5 to engage with the internal surface of the abdominal wall 9 (Fig. 4).

Next the proximal member 2 is threaded over the sleeve 4 with the sleeve 4 passing between the inner ring 6 and the outer ring 7 and the inner ring etc. The proximal member 2 is then moved downwardly relative to the sleeve 4 by pulling the sleeve 4 taut upwardly and pushing the proximal member 2 downwardly (Figs. 5 and 6). This action of moving the proximal member 2 relative to the sleeve 4 shortens the axial extent of the portion of the sleeve 4 which lines the wound opening 3, and thereby results in lateral retraction of the wound opening 3, as illustrated in Figs. 7 and 8.

The tight-fit arrangement of the inner ring 6 in the recess of the outer ring 7 ensures that the sleeve 4 is securely gripped between the rings 6, 7. Thus the proximal member 2 acts as a lock to maintain the wound opening 3 in the retracted configuration illustrated in Figs. 7 and 8.

The portion of the sleeve 4 proximally of the rings 6, 7 is thereafter surplus to requirements and may be removed, for example by cutting it away (Fig. 9).

By engaging the internal surface of the abdominal wall 9, the distal O-ring 5 acts as an anchor to maintain the retractor 1 in position in the wound opening 3, during use.

An alternative method of using the wound retractor 1 to retract the wound opening 3 is illustrated in Figs. 10 and 11. In this case, the inner ring 6 and the outer ring 7 are moved downwardly relative to the sleeve 4 before the inner ring 6 is snap-fitted into position in the recess of the outer ring 7. The inner ring 6 is located above the outer ring 7.

The inner ring 6 is pushed downwardly, which causes the outer ring 7 to move downwardly also, while pulling the sleeve 4 taut upwardly until the outer ring 7 engages the external surface of the abdominal wall 9. Further pushing of the inner ring 6 downwardly then causes the inner ring 6 to snap into position in the recess of the outer ring 7 securely gripping the sleeve 4 between the rings 6, 7. The action of the inner ring 6 snapping into position in the recess of the outer ring 7 may be configured to cut the sleeve 4 for subsequent removal of the surplus proximal portion of the sleeve 4.

Referring to Figs. 12 to 15 there is illustrated another method of using the wound retractor 1. In this case the retractor 1 is mounted to a blunt obturator 11 before insertion into the wound opening 3. The obturator 11 and the retractor 1 are then inserted together through the wound opening 3 until the distal O-ring 5 is fully located within the abdominal cavity 10 and the sleeve 4 lines the wound opening 3 (Fig. 12).

The distal O-ring 5 is engaged with the internal surface of the abdominal wall 9, and the proximal member 2 is moved downwardly relative to the sleeve 4 (Fig. 13), in a manner similar to that described previously with reference to Figs. 4 to 8. The obturator 11 may then be removed from the wound opening 3. The proximal member 2 acts as a lock thereafter to maintain the wound opening 3 in the retracted configuration.

It has been found that the use of the obturator 11 may assist in deployment of the wound retractor 1. In particular, retraction of the wound opening 3 by means of the sleeve 4 during the set-up procedure is not required when the obturator 11 is employed.

5

A sharp obturator could alternatively be employed in a similar manner to that described previously with reference to Figs. 12 and 13. A sharp obturator has the additional advantage that the initial incision 8 in the abdominal wall 9 could be made using the sharp obturator.

10

Figs. 14 and 15 illustrate a further method of retracting the wound opening 3 using the wound retractor 1, which is similar to the method described previously with reference to Figs. 12 and 13.

15

In this case, the retractor 1 is mounted to the obturator 11 before the inner ring 6 is snap-fitted into position in the recess of the outer ring 7. A tubular pusher 12 is slidably mounted around the obturator 11 for engagement with the inner ring 6.

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By pushing on the pusher 12 downwardly while pulling the sleeve 4 taut upwardly, the rings 6, 7 are moved downwardly until the outer ring 7 engages the external surface of the abdominal wall 9. Further pushing of the pusher 12 downwardly then causes the inner ring 6 to snap into position in the recess of the outer ring 7, and simultaneously causes cutting of the sleeve 4.

25

The sleeve 4 is thus securely gripped between the rings 6, 7 to maintain the wound opening 3 in the retracted configuration. Also the surplus proximal portion of the sleeve 4 which has been cut away may be removed.

30

The wound opening 1 may include means to seal the retracted wound opening 3. For example, Fig. 16 illustrates a sealing cap 13 releasably mounted to the proximal

member 2 externally of the wound opening 3. The cap 13 may be temporarily mounted to the proximal member 2 to maintain a gas-tight seal of the retracted wound opening 3, for example to maintain pneumoperitoneum within the abdominal cavity 10. If it is desired to access the abdominal cavity 10, and/or to remove matter from within the abdominal cavity 10, the cap 13 can be quickly and easily removed to reveal the retracted wound opening 3.

It will be appreciated that various other sealing means may alternatively be provided with the wound retractor 1. For example, one or more valves may be included to facilitate sealed access of an object, such as an instrument, through the retracted wound opening 3.

The distal end of the sleeve 4 may be flared distally outwardly towards the distal O-ring 20, as illustrated in the wound retractor 25 of Fig.17. This arrangement enhances the anchoring of the retractor 25 in position in the wound opening 3 with less risk of the distal O-ring 20 being pulled up through the wound opening 3, during use.

A variety of different configurations are possible for the distal member of the wound retractor within the scope of this invention. For example, the distal member may be a standard O-ring 21, as illustrated in the wound retractor 26 of Fig. 18, or the distal member may be provided in the form of a flexible, annular disc 22, as illustrated in the wound retractor 27 of Fig. 19. It has been found that the disc 22 provides enhanced anchoring of the retractor 27 in position in the wound opening 3, during use.

In addition, a variety of different configurations are possible for the proximal member of the wound retractor within the scope of the invention. For example, the inner ring of the proximal member may be provided in the form of a standard O-ring 30, as illustrated in Fig. 20. Alternatively one or more valves, such as a lip seal 32,

may be provided as part of the inner ring 31, as illustrated in Fig. 21 to facilitate sealed access of an object, such as an instrument, through the proximal member. As a further alternative, the proximal member may comprise a closed cap 33 (Fig. 22) to completely seal the retracted wound opening 3, for example, to maintain pneumoperitoneum in the abdominal cavity 10.

It will be appreciated that the configuration of the proximal member 2 may be reversed. For example, an inner ring 41 may define a "C"-shaped recess and an outer ring 40 may have a circular cross-section, as illustrated in Fig. 23.

The invention is not limited to the embodiments hereinbefore described, with reference to the accompanying drawings, which may be varied in construction and detail.

**Claims**

1. A wound retractor comprising:-

5 a retracting member for insertion into a wound opening; and  
a proximal member for location externally of a wound opening;

10 the proximal member being movable relative to the retracting member to shorten the axial extent of the retracting member to laterally retract a wound opening.

2. A retractor as claimed in claim 1 wherein the proximal member comprises an annular ring means.

15

3. A retractor as claimed in claim 2 wherein the annular ring means comprises an inner ring and an outer ring between which the retracting member may be lead.

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4. A retractor as claimed in claim 3 wherein one of the rings defines a projection for location in a complimentary recess of the outer ring with the retracting member located therebetween.

25

5. A retractor as claimed in claim 4 wherein the projection is a relatively tight fit in the recess to grip the retracting member therebetween.

6. A retractor as claimed in claim 4 or 5 wherein the projection is locatable in the recess in a snap-fit manner.

7. A retractor as claimed in any of claims 4 to 6 wherein the inner ring defines the projection and the outer ring defines the recess.
- 5 8. A retractor as claimed in any of claims 4 to 6 wherein the outer ring defines the projection and the inner ring defines the recess.
9. A retractor as claimed in any of claims 1 to 8 wherein the proximal member comprises one or more valves to facilitate sealed access of an object through the proximal member.
- 10 10. A retractor as claimed in any of claims 1 to 9 wherein the retractor comprises a distal member coupled to a distal end of the retracting member.
- 15 11. A retractor as claimed in claim 10 wherein the distal member comprises an O-ring.
12. A retractor as claimed in claim 10 wherein the distal member comprises an annular disc.
- 20 13. A retractor as claimed in any of claims 10 to 12 wherein the distal member is of a resilient material.
14. A retractor as claimed in any of claims 1 to 13 wherein the retracting member is flared distally outwardly.
- 25 15. A retractor as claimed in any of claims 1 to 14 wherein the retractor comprises means to seal a retracted wound opening.
- 30 16. A retractor as claimed in claim 15 wherein the sealing means is provided externally of a wound opening.

17. A retractor as claimed in claim 15 or 16 wherein the sealing means is mountable to the proximal member.
18. A retractor as claimed in claim 17 wherein the sealing means comprises a cap.
19. A retractor as claimed in any of claims 15 to 18 wherein the sealing means comprises one or more valves to facilitate sealed access of an object through the sealing means.
20. A retractor as claimed in any of claims 1 to 19 wherein the retracting member comprises a sleeve to line a wound opening.
21. A wound retractor substantially as hereinbefore described with reference to the accompanying drawings.
22. A method of retracting a wound opening, the method comprising the steps of:-
  - providing a wound retractor comprising a retracting member, and a proximal member;
  - inserting the retracting member into a wound opening;
  - locating the proximal member externally of the wound opening; and
  - moving the proximal member relative to the retracting member to shorten the axial extent of the retracting member to laterally retract the wound opening.



23. A method as claimed in claim 22 wherein the retracting member comprises a proximal portion located proximally of the proximal member and a distal portion located distally of the proximal member, and the method comprises the step of decoupling the proximal portion from the distal portion after retraction of the wound opening.
24. A method as claimed in claim 23 wherein the proximal portion is decoupled from the distal portion by a cutting action.
25. A method as claimed in any of claims 22 to 24 wherein the proximal member comprises an inner ring and an outer ring, and the method comprises the step of snap-fitting the inner ring relative to the outer ring to grip the retracting member therebetween.
26. A method as claimed in claim 25 wherein the inner ring is snap-fitted relative to the outer ring after retraction of the wound opening.
27. A method as claimed in any of claims 23 to 26 wherein the step of snap-fitting the inner ring relative to the outer ring decouples the proximal portion of the retracting member from the distal portion.
28. A method as claimed in any of claims 22 to 27 wherein the method comprises the step of mounting the retracting member to an obturator, and the obturator is inserted into the wound opening to insert the retracting member into the wound opening.
29. A method as claimed in any of claims 22 to 28 wherein the method comprises the step of sealing the retracted wound opening.

30. A method of retracting a wound opening substantially as hereinbefore described with reference to the accompanying drawings.

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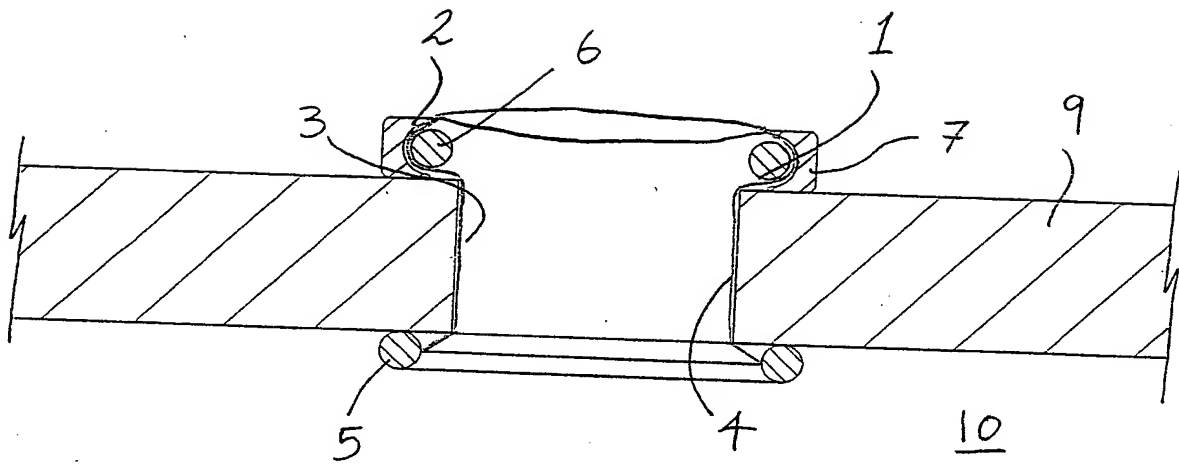


Fig. 1

2/14

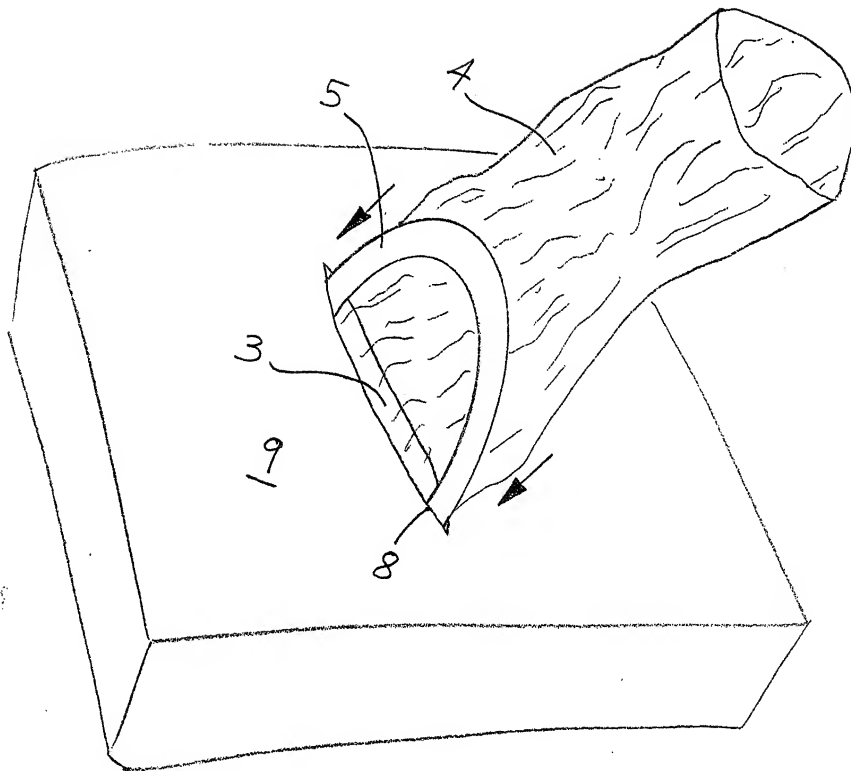


Fig. 2

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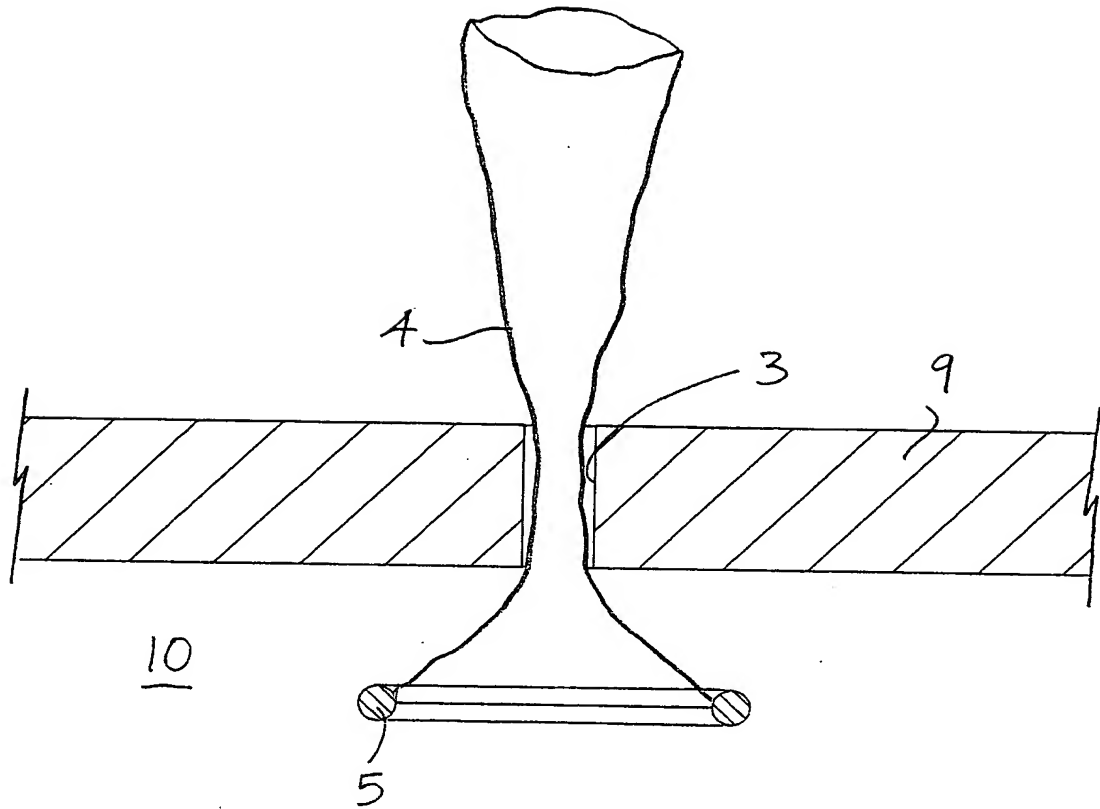


Fig. 3

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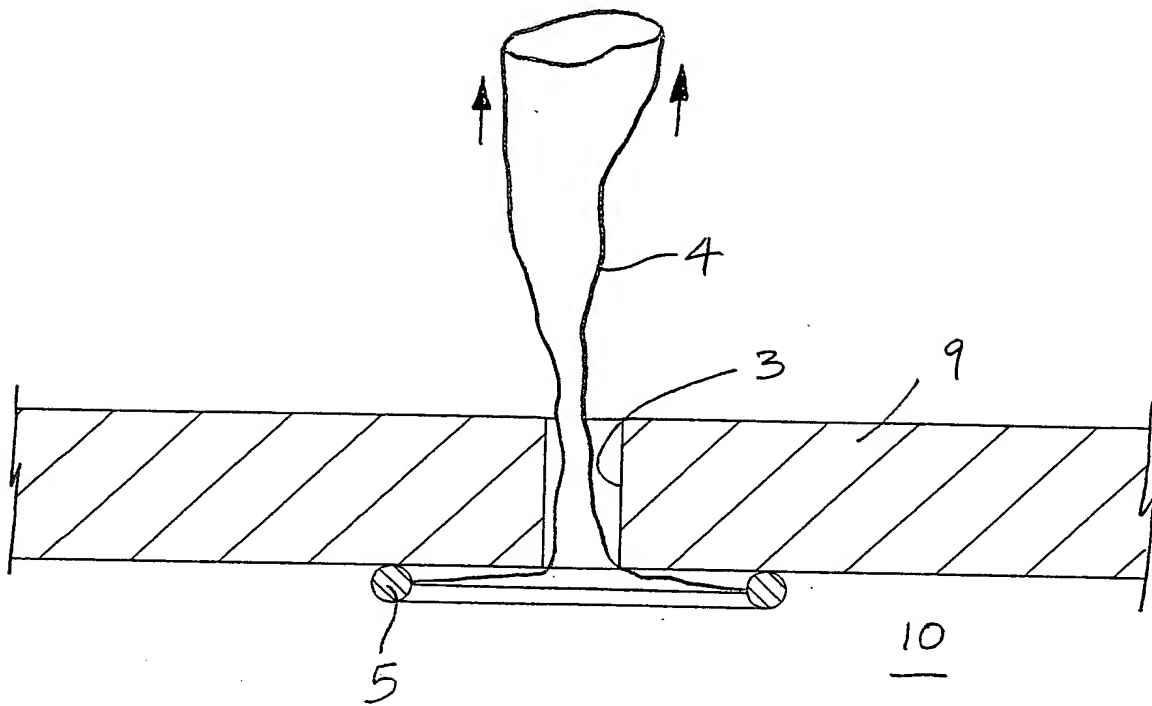


Fig. 4

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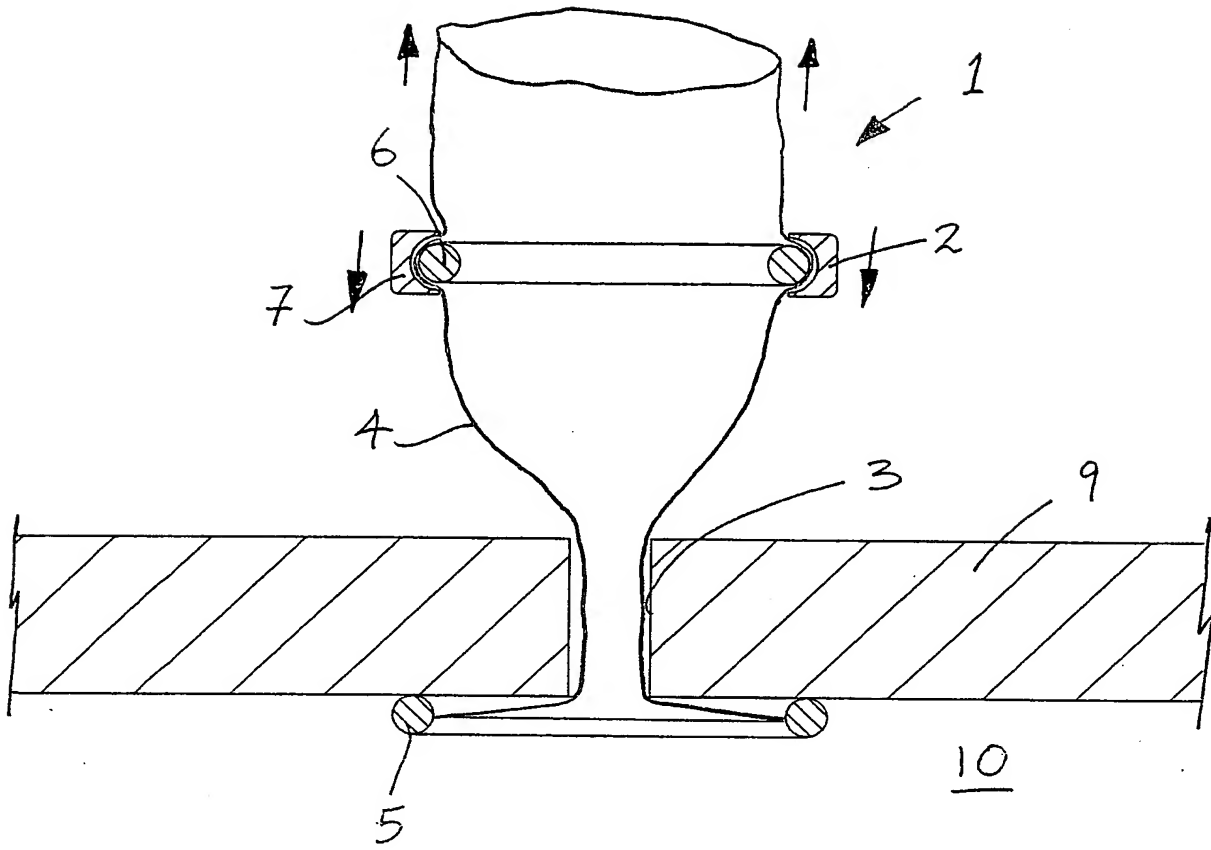


Fig. 5

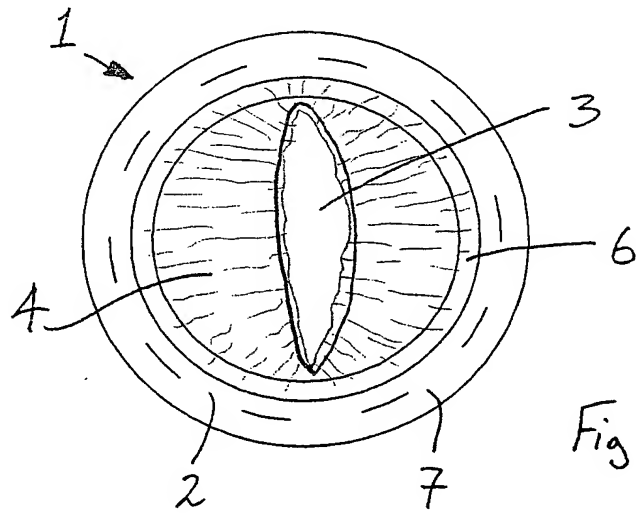


Fig. 6

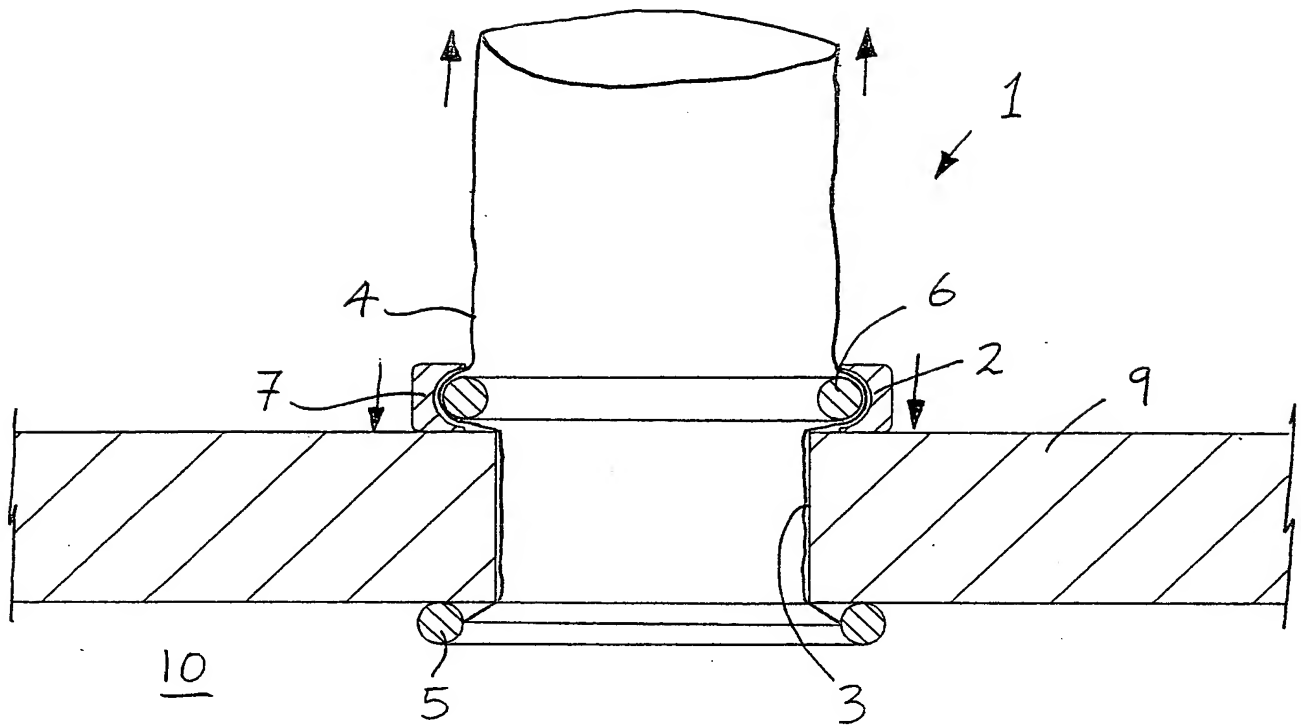


Fig. 7

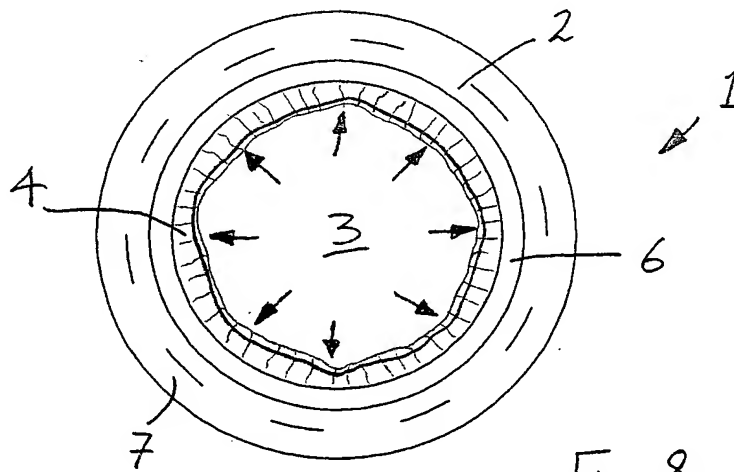


Fig. 8



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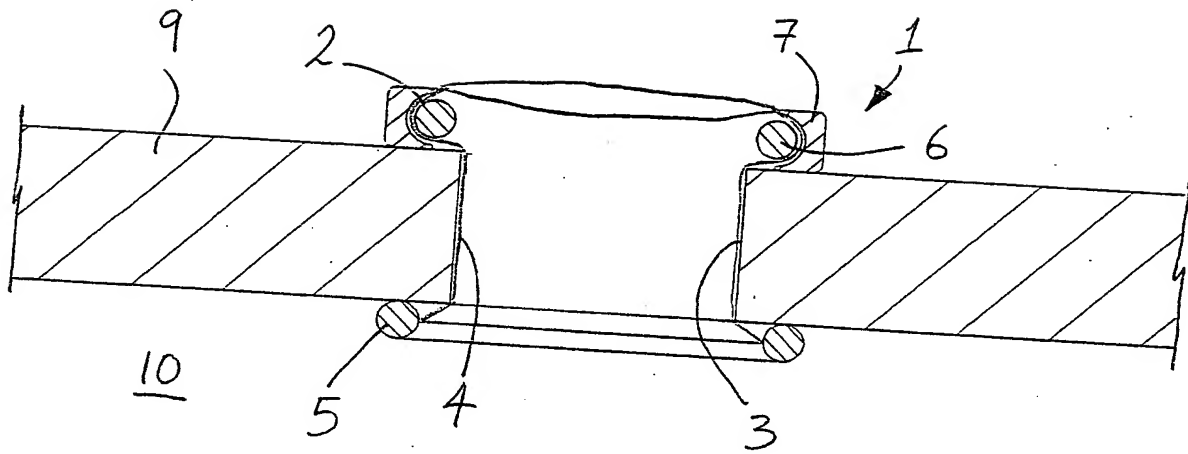
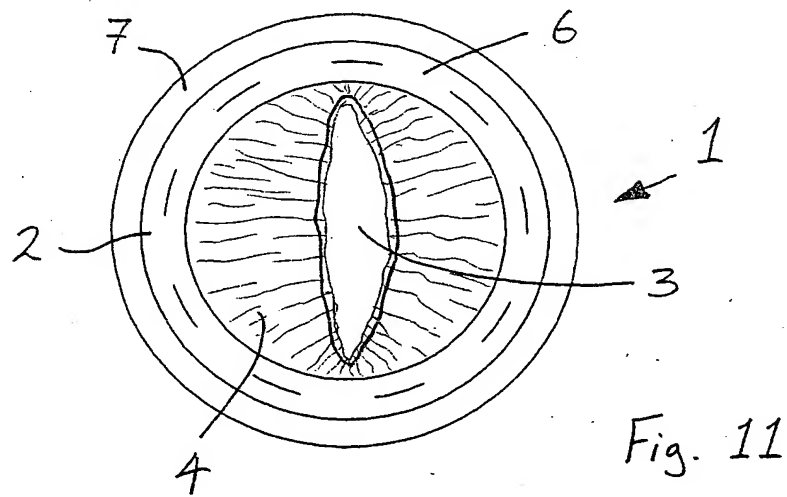
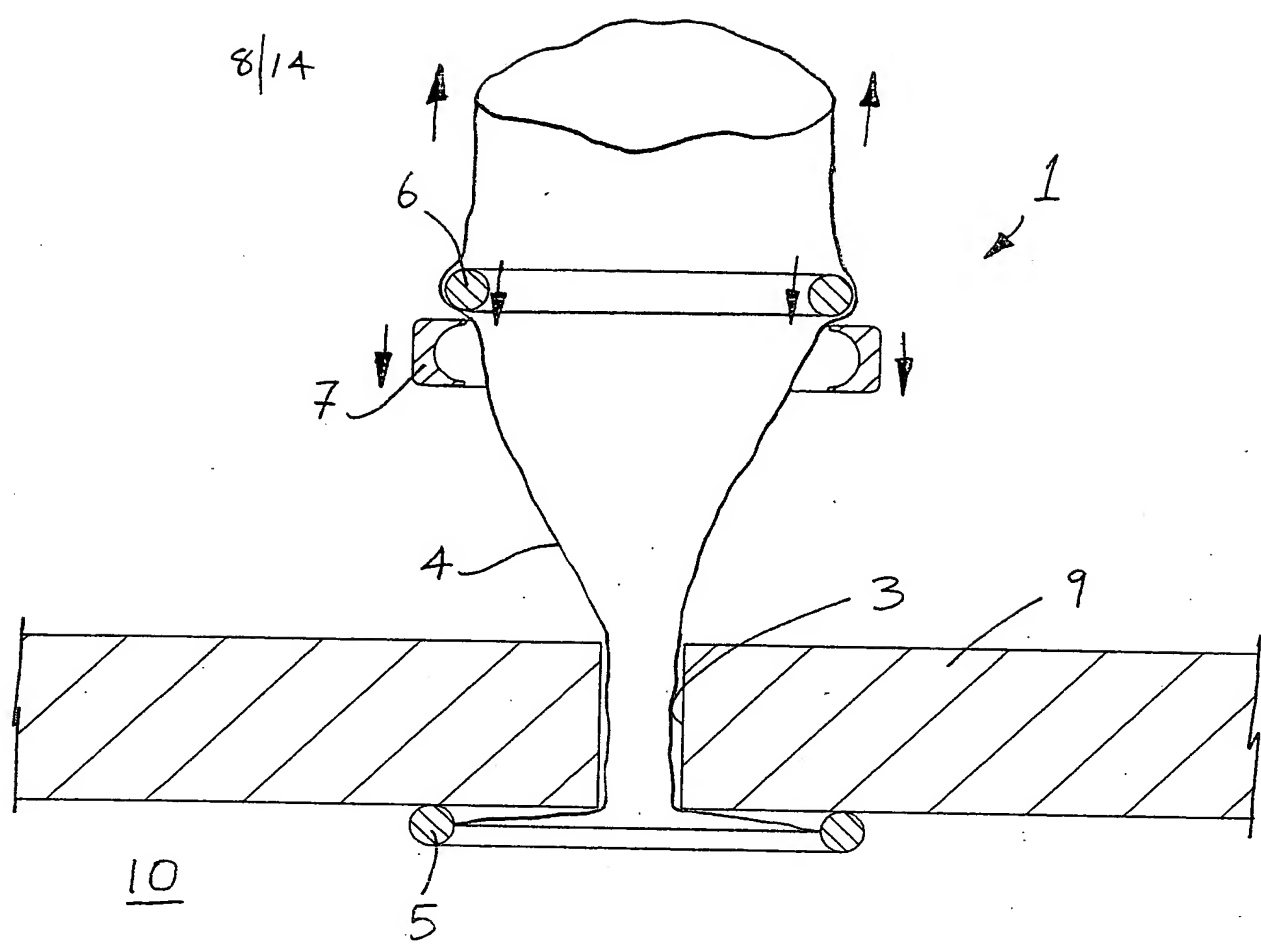


Fig. 9

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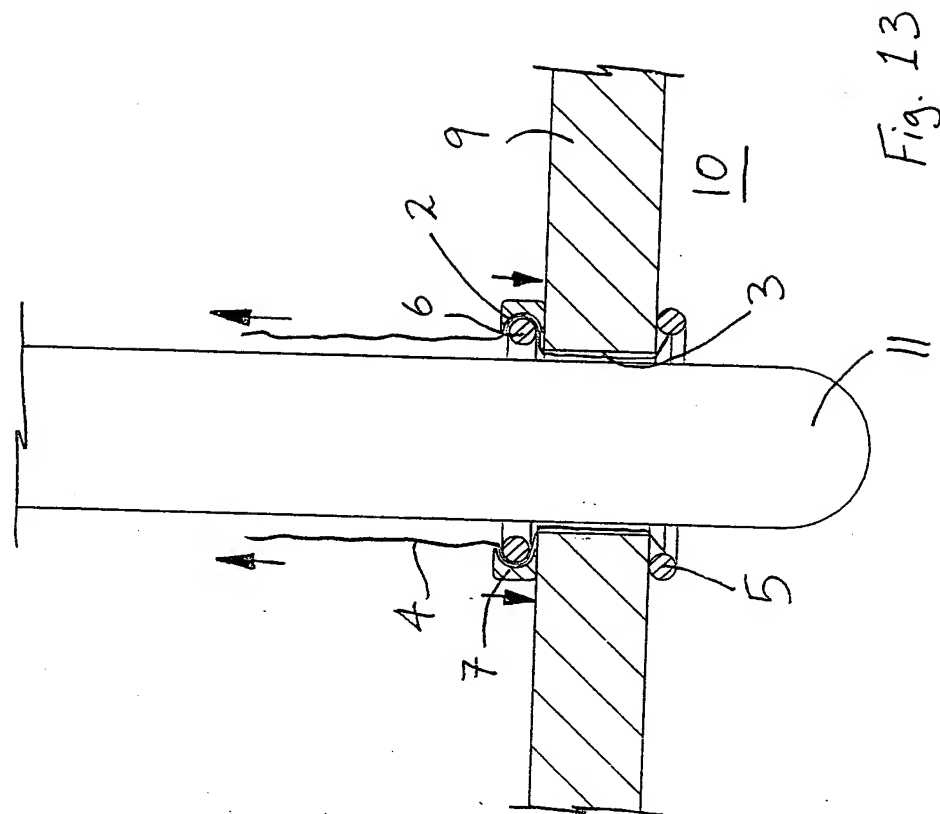


Fig. 13

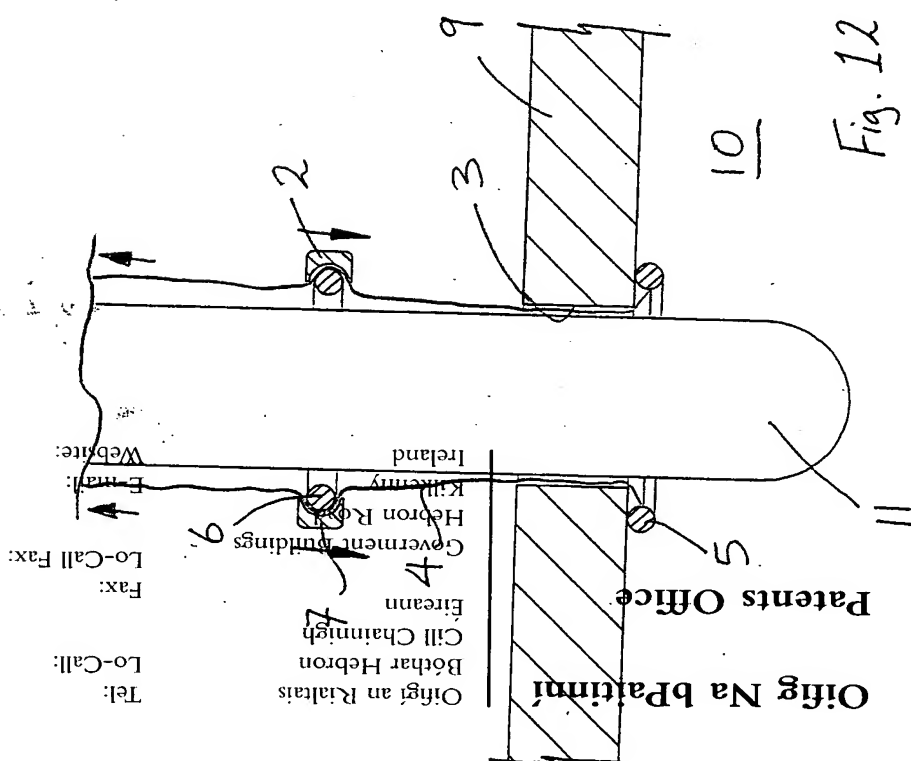


Fig. 12

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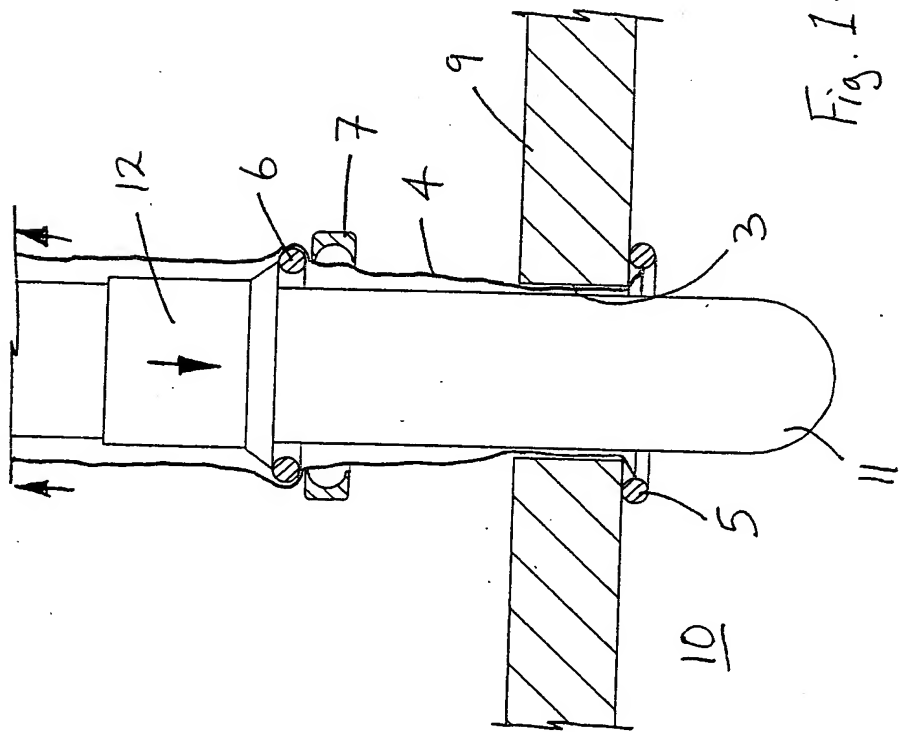


Fig. 14

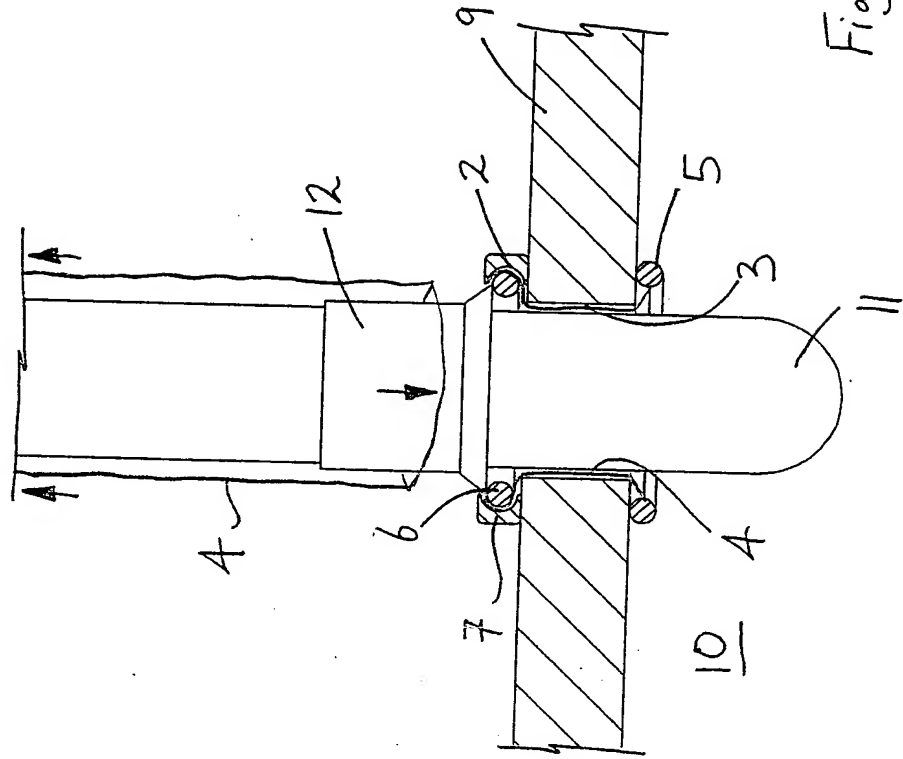


Fig. 15

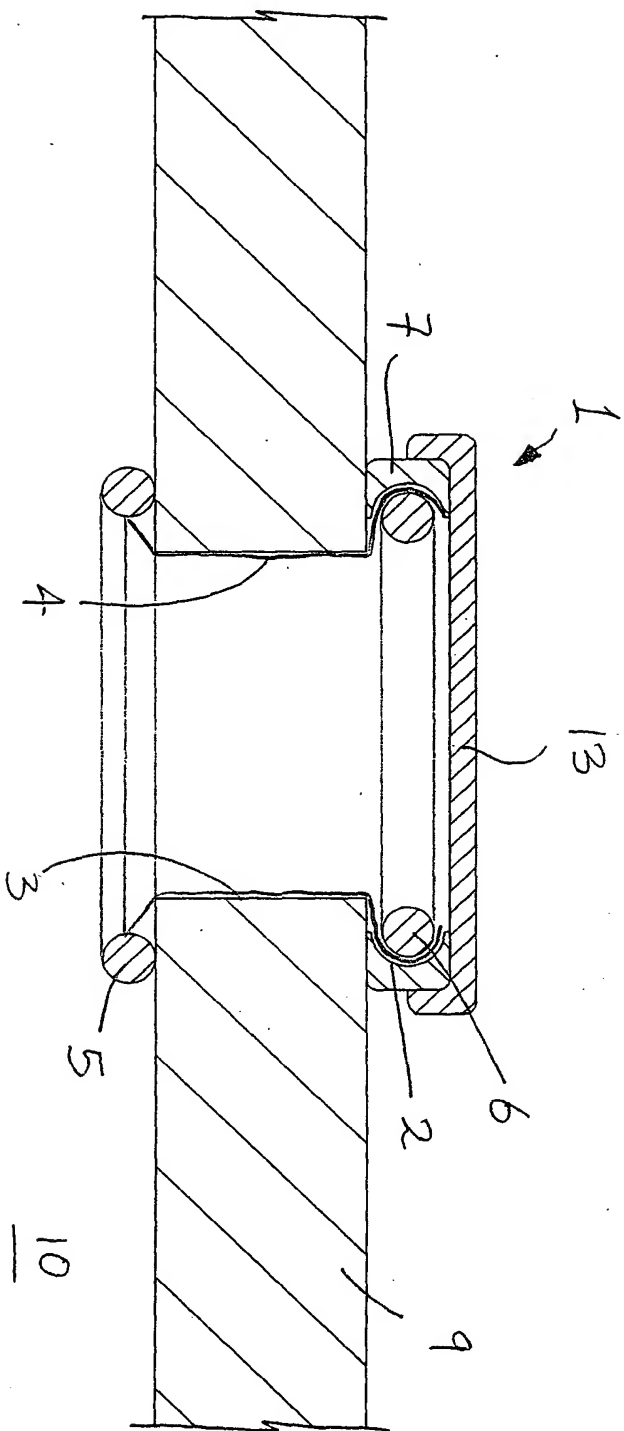


Fig. 16

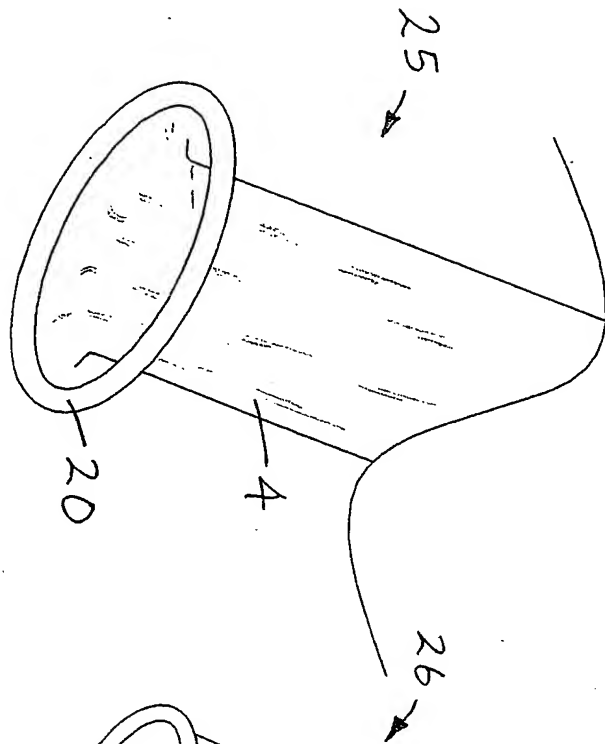


Fig. 17

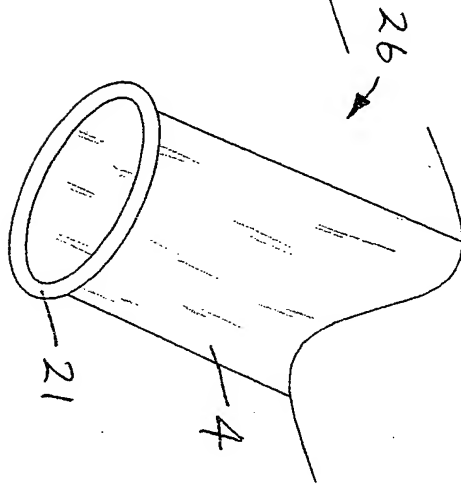


Fig. 18

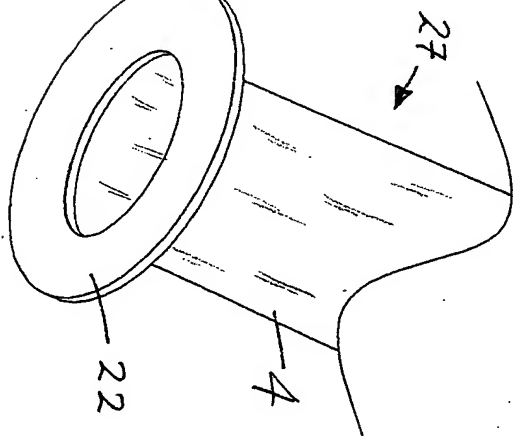


Fig. 19

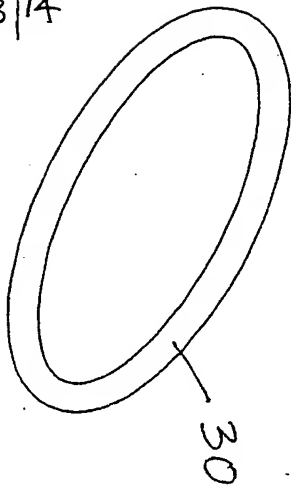


Fig. 20

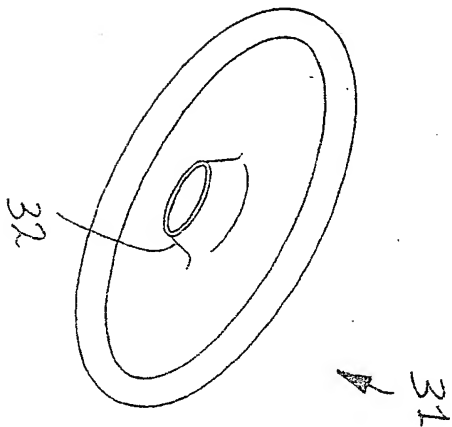


Fig. 21

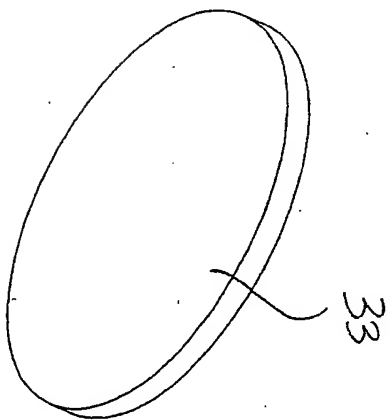


Fig. 22

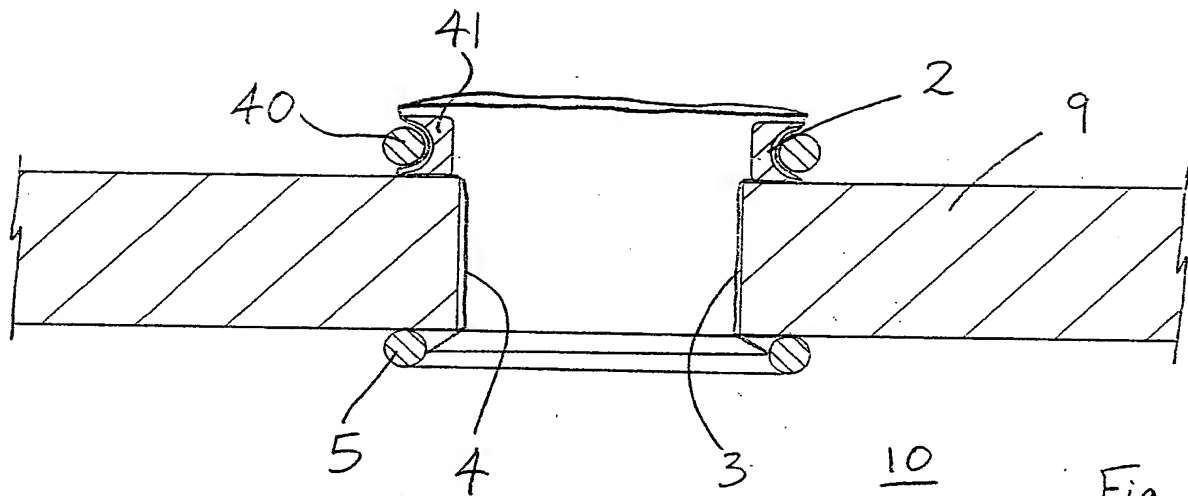


Fig. 23